EPA Fact Sheet

NPDES Permit Number: AK-002295-1
Date: August 18, 2000
Public Notice Expiration Date: September 18, 2000
Technical Contact: Madonna Narvaez 206/553-1774
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The U.S. Environmental Protection Agency (EPA) Plans To Reissue A Wastewater Discharge Permit To:

CITY AND BOROUGH OF JUNEAU
Mendenhall Wastewater Treatment Facility
155 South Seward Street
Juneau, Alaska 99801

and
The State of Alaska Proposes to Certify the Permit and Issue a Consistency Determination

EPA Proposes NPDES Permit Reissuance.

EPA proposes to reissue a *National Pollutant Discharge Elimination System* (NPDES) Permit to the City and Borough of Juneau. The draft permit sets conditions on the discharge--or release--of pollutants from the Mendenhall wastewater treatment facility to the Mendenhall River.

This Fact Sheet includes:
- information on public comment, public hearing, and appeal procedures
- a listing of past and proposed effluent limitations and other conditions
- a map and description of the discharge location and
- detailed technical material supporting the conditions in the permit

The State of Alaska Proposes Certification and Consistency Determination.

The Alaska Department of Environmental Conservation (ADEC) proposes to certify the NPDES permit for the City and Borough of Juneau, under section 401 of the Clean Water Act. The state provided preliminary comments prior to the public notice which are incorporated. The State of Alaska, Office of Management and Budget, Division of governmental Coordination (DGC) intends to review this action for consistency with the approved Alaska Coastal Management Program (ACMP). For more information regarding the DGC consistency demonstration, contact Lorraine Marshall at 907-465-8790.

Public Comment.

EPA will consider all comments before issuing the final permit. Those wishing to comment on the draft permit may do so in writing by the expiration date of the Public Notice. A request for public hearing must state the nature of the issues to be raised as well as the requester's name, address and telephone number. After the Public Notice expires, and all significant comments have been considered, EPA's regional Director for the Office of Water will make a final decision regarding permit reissuance.

Persons wishing to comment on State Certification should submit written comments by the Public Notice expiration date to ADEC, Air and Water Quality Division, 410 Willoughby Ave., Suite 105, Juneau, Alaska 99801-1795.

If no significant comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If comments are received, EPA will address the comments and issue the permit. The permit will become effective 33 days after the issuance date, unless an appeal is filed with the Environmental Appeals Board within 33 days.

Documents are Available for Review.

The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday (See address below). Draft permits, Fact Sheets, and other information can also be found by visiting the Region 10 website at www.epa.gov/r10earth/water.htm.

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue, OW-130
Seattle, Washington 98101
(206) 553-1774 or
1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The Fact Sheet and draft permit are also available at:

EPA Alaska Operations Office
410 Willoughby Avenue
Juneau, Alaska 99801-1795

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I. APPLICANT

Mendenhall Wastewater Treatment Facility NPDES Permit No. AK-002295-1

Facility Location:
2009 Radcliffe Road
Juneau, Alaska 99801

Mailing Address:
155 South Seward Street
Juneau, Alaska 99801

Facility contact: Andrew Bronson, Wastewater Utility Superintendent

II. FACILITY ACTIVITY

The City and Borough of Juneau (CBJ) owns, operates, and maintains a complete mix modification of activated sludge secondary treatment facility. The wastewater treatment facility (WWTF) discharges treated municipal wastewater to the Mendenhall River and incinerates the sludge offsite. The system has no combined sewers. The facility serves a resident population of 20,000. The City and Borough of Juneau is a tourist area, therefore, actual population is higher during summer months. Details about the wastewater treatment process are included in Appendix A. The map in Appendix B shows the location of the treatment facility and discharge.

III. RECEIVING WATER

The applicable water quality standards are those adopted by the State of Alaska Department of Environmental Conservation (ADEC) at 18 AAC 70. State water quality standards protect the Mendenhall River for the freshwater use classifications of water supply, contact recreation, secondary recreation, and the propagation of fish, shellfish, other aquatic life and wildlife (18 AAC 70.050).

The amount of dilution available from the Mendenhall River is dictated by requirements in the Alaska State Water Quality Standards. These standards stipulate that any mixing zone shall be as small as practicable (18 AAC 70.032). For the Mendenhall discharge, ADEC has determined that 100 percent of the 7Q10 low flow will constitute the allowable mixing zone. This translates to a dilution ratio of 10 to 1. The 7Q10 low flow value was estimated using information from USGS station number 15052500 and flows at Brotherhood Bridge, just above the treatment plant outfall.

IV. FACILITY BACKGROUND

The current Mendenhall permit was issued on August 8, 1994 and expired on September 8, 1999. The EPA received an updated permit application from the CBJ

dated March 5, 1999. Under the regulations at 40 CFR § 122.6, the CBJ is authorized to continue discharging under the terms of the existing permit until a new permit is issued. Design flow for the facility is 4.9 mgd.

A review of the facility's discharge monitoring reports for the last three years shows that the facility's average flow is about 2.7 mgd and that the facility has generally been in compliance with discharge limitations. Discharge monitoring reports are forms the facility uses to report results of self-monitoring, including effluent testing results.

V. EFFLUENT LIMITATIONS

EPA followed the Clean Water Act, state and federal regulations, and EPA's 1991 *Technical Support Document for Water Quality-Based Toxics Control (TSD)* to determine the need for and to develop the proposed effluent limits. Appendix C provides the basis for the development of effluent limits.

In general, the Clean Water Act requires that the effluent limits for a particular pollutant be the more stringent of either the *technology-based* or *water quality-based* limits. Technology-based limits are set based on the level of treatment that is achievable using available technology. Water quality-based limits are required for pollutants that are discharged at levels that could cause or contribute to an exceedance above the state water quality standards in the Mendenhall River. Water quality-based effluent limits are only required if the pollutants are discharged at levels which cause or have the reasonable potential to cause or contribute to exceedances of the Alaska Water Quality Standards. The determination of the need for water quality-based limits is presented in Appendix C.
In addition to water quality-based limitations for pollutants that could cause or contribute to exceedances of standards, EPA must consider the state's antidegradation policy (18 AAC 70.010). This policy is designed to protect existing water quality when the existing quality is better than that required to meet the standard and to prevent water quality from being degraded below the standard when existing quality just meets the standard. The draft permit will result in no increases in the authorized pollutant loadings to the Mendenhall River. Therefore, the draft permit is consistent with Alaska's antidegradation policy.

The draft permit includes both technology-based and water quality-based limits (See Appendix C). For wastewater treatment plants, technology-based limits cover three parameters: five day Biochemical Oxygen Demand (BOD_5), total suspended solids (TSS), and pH. In addition, this permit includes water quality-based limits for fecal coliform, copper, lead, silver, zinc, total ammonia, and total residual chlorine. Table V-1

presents the effluent limits for the draft permit. For comparison purposes, the table also shows the effluent limitations in the 1994 permit.

Table V-1: Mendenhall Effluent Limitations

Parameter	Monthly Average Limit		Average Weekly Limit		Daily Maximum Limit	
	Draft	1994	Draft	1994	Draft	1994
Flow, mgd	---	---	---	---	4.9	4.9
BOD_5[1]	30 mg/L 1226 lbs/day	30 mg/L 690 lbs/day	45 mg/L 1839 lbs/day	45 mg/L 1035 lbs/day	60 mg/L 2452 lbs/day	60 mg/L 1380 lbs/day
TSS[1]	30 mg/L 1226 lbs/day	30 mg/L 690 lbs/day	45 mg/L 1839 lbs/day	45 mg/L 1035 lbs/day	60 mg/L 2452 lbs/day	60 mg/L 1380 lbs/day
Fecal Coliform, # FC/100 ml	200	200	400	400	400[2]	800
Copper[3]	8.36 Fg/L 0.342 lbs/day	---	---	---	20.1 Fg/L 0.858 lbs/day	---
Lead[3]	5.5 Fg/L 0.225 lbs/day	---	---	---	11.0 Fg/L 0.45 lbs/day	---
Silver[3]	0.87 Fg/L 0.036 lbs/day	---	---	---	1.75 Fg/L 0.072 lbs/day	---
Zinc[3]	71.4 Fg/L 2.92 lbs/day	---	---	---	149 Fg/L 6.09 lbs/day	---
Total Ammonia as N	26.4 mg/L 1079 lbs/day	---	----	---	39.7 mg/L 1622 lbs/day	---
Total Residual Chlorine	---	0.002 mg/L	---	---	0.002 mg/L 0.082 lbs/day	---

1 The average monthly percent removal shall be greater than 85%.
2 Not more than 10 percent may exceed 400/100 ml.
3 This parameter measured as total recoverable.

The draft permit requires that discharges be free from floating, suspended, or submerged matter in concentrations that cause/may cause a nuisance. It also prohibits discharges of waste streams that are not part of the normal operation of the facility, as reported in the permit application. The draft permit also requires that the pH of the WWTP discharge be within the water quality-based range of 6.5 - 8.5 S.U. The 1994 permit requirement was the technology-based range of 6.0 - 9.0 S.U. Fecal coliform limits were based on the more stringent of the water quality-based or ADEC technology-based limitations from 18 AAC 72.

VI. MONITORING REQUIREMENTS

A. Effluent Monitoring.

Section 308 of the Clean Water Act and federal regulation 40 CFR § 122.44(i) requires that monitoring be included in permits to determine compliance with effluent limitations. Monitoring may also be required to gather data for future effluent limitations or to monitor effluent impacts on receiving water quality. The Permittee is responsible for conducting the monitoring and for reporting results on Discharge Monitoring Reports (DMRs) to EPA. Table VI-1 presents the proposed monitoring requirements based on the minimum sampling necessary to adequately monitor the facility's performance. For comparison purposes, the table also shows the monitoring requirements in the 1994 permit.

TABLE VI-1. Monitoring Requirements for Outfall 001

Parameter	1994 Sample Frequency	Proposed Sample Frequency	Sample Type
Flow, mgd	continuous	continuous	recording
BOD_5, mg/L[1]	1/week	1/week	24-hour composite
TSS, mg/L[1]	1/week	1/week	24-hour composite
pH, standard units[2]	5/week	5 days/week	grab
Fecal Coliform Bacteria, colonies/100 ml	2/week	2 days/week	grab
Total Residual Chlorine, mg/L	5/week	5 days/week	grab

Parameter	1994 Sample Frequency	Proposed Sample Frequency	Sample Type
Temperature[3], EC	N/A	5 days/week	grab
Copper, Fg/L	N/A	1/month	24-hour composite
Cyanide, Fg/L	N/A	**As specified in Part I.D.3. of the permit**	24-hour composite
Lead, Fg/L	N/A	1/month	24-hour composite
Silver, Fg/L	N/A	1/month	24-hour composite
Zinc, Fg/L	N/A	1/month	24-hour composite
Hardness as $CaCO_3$, mg/L	N/A	Whenever metals are sampled	24-hour composite
Alkalinity as $CaCO_3$, mg/L	N/A	Whenever metals are sampled	24-hour composite
Dissolved Oxygen, mg/L	N/A	1/quarter **until 12 samples collected**	grab
Total Ammonia as N, mg/L	N/A	1/week	24-hour composite
Whole Effluent Toxicity	Quarterly, with possibility of reduction of frequency	2 times/year	24-hour composite

1 Percent Removal Monitoring: The percent BOD_5 and TSS removal will be reported on each monthly DMR form.
2 The Permittee shall report the number and duration of pH excursions during the month with the DMR for that month.
3 Monitoring for this shall continue for 12 months after the effective date of the permit.

B. Representative Sampling.

The requirement in the federal regulations regarding representative sampling (40 CFR § 122.41[j]) has been expanded and specifically requires sampling whenever a bypass, spill, or non-routine discharge of pollutants occurs, if the discharge may reasonably be expected to cause or contribute to a violation of an effluent limit under the permit. This provision is included in the draft permit because routine monitoring could easily miss permit violations and/or water quality standards exceedances that could result from bypasses, spills, or non-routine discharges. This requirement directs the Permittee to conduct

additional, targeted monitoring to quantify the effects of these occurrences on the final effluent discharge.

C. Ambient Monitoring.

The draft permit requires the Permittee to conduct monthly and quarterly ambient (in-stream) monitoring upstream and downstream for fecal coliform and upstream of outfall 001 for all other parameters. Table VI-2 presents the draft monitoring requirements that will be used to verify the assumptions made in permit limit development regarding receiving water conditions. Based on the results of this study, EPA will determine whether or not to revise these permit limits when the permit is renewed.

TABLE VI-2. Ambient Monitoring Requirements for Outfall 001

Parameter	Draft Sample Frequency
Flow, mgd	1/month, from USGS gauging station
Total Ammonia[1], mg/L N	1/month in May, June, July, August, September, October, and once in November - April
pH[1], standard units	1/month in May, June, July, August, September, October, and once in November - April
Temperature[1], EC	1/month in May, June, July, August, September, October, and once in November - April
Turbidity[1], NTU	1/quarter until 12 samples obtained
Dissolved Oxygen (DO)[1], mg/L	1/quarter until 12 samples obtained
Copper[2], Fg/L	1/quarter until 12 samples obtained
Lead[2], Fg/L	1/quarter until 12 samples obtained
Silver[2], Fg/L	1/quarter until 12 samples obtained
Zinc[2], Fg/L	1/quarter until 12 samples obtained
Hardness as $CaCO_3$, mg/L	Whenever metals are sampled
Alkalinity as $CaCO_3$, mg/L	Whenever metals are sampled
Fecal Coliform Bacteria, FC/100 ml	1/month in May, June, July, August, September, October, and twice in November - April

1 If weather conditions during the scheduled month prevent collecting samples, then that sample shall be collected at the next earliest opportunity.
2 These parameters shall be analyzed as total recoverable.

The ambient monitoring for DO, turbidity, pH, total ammonia, temperature, copper, lead, silver, zinc, hardness and alkalinity are needed to assess compliance with the Alaska criteria for DO, turbidity, ammonia, copper, lead, silver, and zinc. Because of safety concerns, in the event weather conditions prevent sampling during a quarter, the permittee is required to sample as soon as possible during the next quarter. Fecal coliform monitoring shall be conducted twice during the winter. The permittee is required to sample fecal coliform at the edge of the mixing zone as well as upstream of the outfall.

D. Quantification Levels.

Water quality-based effluent limits (WQBELs) have been incorporated into the permit to protect State water quality standards. The WQBELs for total residual chlorine, copper, lead, and silver fall near or below the capability of current analytical technology to detect and/or quantify the parameter (i.e., the method detection limit or MDL). In order to determine compliance with the limit for these parameters, EPA is establishing the minimum level (ML) as the quantification level for use in laboratory analysis.

EPA believes that the use of the ML as an analytical chemistry performance standard provides an unambiguous and rational means to demonstrate that the best chemistry available at the time of permit issuance is being used. Where an ML has not been published, EPA will use the interim minimum level (IML).[1]

The ML is defined as the lowest concentration that gives recognizable signals and an acceptable calibration point. It is the equivalent concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes and processing steps have been followed. MLs are analyte- and method-specific and are established during the development and validation of the method. The published ML for total residual chlorine is 0.100 mg/L. However, the Mendenhall Treatment plant staff indicated that they have confidence in total residual chlorine readings down to 0.04 mg/L. As a result, ADEC has pre-certified that the compliance level should be 0.04 mg/L, and not 0.100 mg/L. The permit has included this condition. While the permittee must report all

[1] The IML = 3.18 X MDL for a given method.

values between the MDL[2] and the ML, the permittee will be judged in compliance with the limit specified in the permit if the values reported are less than the ML.

Table VI-3 below is a summary of approved MLs and IMLs for this discharge.

TABLE VI-3. Minimum Levels and Interim Minimum Levels

Parameter	ML, µg/L	IML, µg/L
Copper	5	----
Lead	----	2.2
Silver	----	0.3
Zinc	5	----
Total Residual Chlorine	40[1]	---

1 Specified by ADEC.

E. Whole Effluent Toxicity.

Whole effluent toxicity (WET) tests are laboratory tests used to determine the concentration of effluent or ambient waters that causes an adverse effect on a group of test organisms during a specified exposure (e.g., 24, 48, or 96 hours for acute, 1 hour to 7 days for chronic tests). The effluent concentration that results in the death of 50% of test organisms during a 96-hour exposure determines the short-term (acute) toxicity. The highest effluent concentration that causes reduced growth or reduced reproduction or other sublethal effect of test organisms or plants during a 1-week (or other specified period of) exposure determines the chronic toxicity.

Federal regulations at 40 CFR § 122.44(d)(1) require that permits contain limits on whole effluent toxicity when a discharge has reasonable potential to cause or contribute to an exceedance of a water quality standard. Alaska water quality standards at 18 AAC 70.023 state that effluents discharged to a water may not impart chronic toxicity to organic organisms, expressed as 1.0 chronic

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2 Method detection limit is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero as determined by a specific laboratory method (40 CFR Part 136).

toxic unit (TUc), at the point of discharge, or if ADEC authorizes a mixing zone in a certification, at or beyond the mixing zone boundary, based on the minimum effluent dilution achieved in the mixing zone. Based on the minimum dilution of 10, the discharged WET should be less than or equal to 10 TUc. The available data, consisting of 13 tests using *Pimephales promelas* (fathead minnow) and 13 tests using *Ceriodaphnia dubia* (water flea) indicated that limits are not needed for WET. Twice-yearly monitoring for WET has been retained in the draft permit.

VII. OTHER PERMIT CONDITIONS

A. Pretreatment Program Requirements.

Industrial sources are capable of discharging pollutants which could cause sludge contamination, water quality impacts, and interference with the operation of the wastewater treatment plants. Since industrial sources discharge to this facility, certain pretreatment requirements, including sampling, are included in the draft permit. The permittee is required to 1) conduct an industrial survey; and 2) submit its existing sewer use ordinance. EPA will review data submitted to determine if the facility should develop and implement a program in accordance with EPA's General Pretreatment Regulations (40 CFR Part 403). While the CBJ conducted an industrial user survey as required by the 1994 permit, EPA believes the survey needs to be updated to include additional characterization of the businesses surveyed. Sampling, twice in the fourth year of the permit, is required to further evaluate the need for additional pretreatment requirements.

B. Quality Assurance Plan.

Federal regulation 40 CFR § 122.41(e) requires the Permittee to develop and keep onsite a Quality Assurance Plan to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. The Permittee is required to develop a Quality Assurance Plan. The Quality Assurance Plan shall consist of standard operating procedures the Permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting.

C. Operation & Maintenance Plan.

Section 402 of the Clean Water Act and federal regulations 40 CFR § 122.44(k)(2) and (3) authorize EPA to require *best management practices*, or

BMPs, in NPDES permits. BMPs are measures for controlling the generation of pollutants and their release to waterways. For municipal facilities, these measures are typically included in the facility Operation & Maintenance (O&M) plans. These measures are important tools for waste minimization and pollution prevention.

The draft permit requires the Mendenhall WWTF to incorporate appropriate BMPs into its O&M plan within 180 days of permit issuance. Specifically, the Permittee must consider spill prevention and control, optimization of chlorine and other chemical use, public education aimed at controlling the introduction of household hazardous materials to the sewer system, and water conservation. To the extent that any of these issues have already been addressed, the Permittee need only reference the appropriate document in its O&M plan. The O&M plan shall be revised as new practices are developed.

D. Municipal Sewage Sludge (Biosolids) Management.

The City and Borough of Juneau Wastewater Treatment Facility's biosolids are primarily domestic. The biosolids are incinerated offsite. The sludge management regulations of 40 CFR Part 503 were designed so that the standards are directly enforceable against most users or disposers of sewage sludge, whether or not they obtain a permit. Therefore, the publication of Part 503 in the *Federal Register* on February 19, 1993 served as notice to the regulated community of its duty to comply with the requirements of the rule.

EPA Region 10 has recently decided to separate the permitting of wastewater discharges and the disposal of biosolids. Under the Clean Water Act, EPA has the authority to issue separate "sludge only" NPDES permits for the purposes of regulating biosolids. EPA has historically implemented the biosolids standards by inclusion of the requirements in facility's NPDES wastewater permit, the other option authorized by the Act.

EPA will issue a sludge-only permit to this facility at a later date. This will likely be in the form of a general permit through which EPA can cover multiple facilities.

Meanwhile, the environment will be protected since 1) the permittee's sludge activities will continue to be subject to the national sewage sludge standards at 40 CFR 503 and 2) ADEC conducts a program to review and approve biosolids activities. Part 503 contains provisions relating to pollutants in sewage sludge, the reduction of pathogens in sewage sludge, the reduction of the

characteristics in sewage sludge that attract vectors, the quality of the exit gas from a sewage sludge incinerator stack, the quality of sewage sludge that is placed in a municipal solid waste landfill unit, the sites where sewage sludge is either land applied or placed for final disposal, and sewage sludge incinerators. The Act prohibits any use or disposal of biosolids not in compliance with these standards. EPA has the authority under the Act to enforce these standards directly, including in the absence of a permit. The Act does not require the facility to have a permit prior to the use or disposal of its biosolids.

E. Additional Permit Provisions.

1. Boilerplate. Sections II, III, and IV of the draft permit contain "boilerplate" requirements. Boilerplate is standard regulatory language that applies to all Permittees and must be included in NPDES permits. Because they are regulations, they cannot be challenged in the context of an NPDES permit action. The boilerplate covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and general requirements.

2. Requirements added by ADEC pre-certification. In its pre-certification of the proposed permit, dated April 20, 2000 and July 5, 2000, ADEC added the following requirements.

   a. The permittee must place sign(s) near the mixing zone and outfall lines. The sign(s) should contain information about the mixing zone, notification that treated wastewater is being discharged, as well as a number to contact for further information;

   b. ADEC be notified of violations, bypasses, facility changes as well as permit modifications;

   c. Treated wastewater flowrate from Juneau-Mendenhall shall not exceed 4.9 mgd;

   d. Tentatively authorized a mixing zone with a minimum dilution of 10:1 for the Mendenhall discharge and ambient monitoring requirements for fecal coliform;

   e. ADEC must be notified whenever there is an increase of more than 10 percent of annual average flow based on the previous 12 months of data; and

f. the permittee must develop and implement a study plan for determining the actual 7Q10 around the outfall location.

ADEC also pre-certified a compliance schedule of three years in which to comply with metals and ammonia permit limits, based on 18 AAC 70.910. Alaska water quality standards were revised in May 1999 to allow for the inclusion of compliance schedules in order to meet water quality standards. These revisions have not yet been approved by EPA. Federal regulations at 40 CFR § 131.21(c) provide that water quality standards do not go into effect until EPA has approved them. As a result, the draft permit does not include a compliance schedule for the new effluent limits.

3. The permit also requires that the permittee compute an annual average value for flow, and BOD_5 and TSS loading entering the facility based on the previous 12 months of data or all data available. When the average annual values exceed the 85 percent of the design criteria for the WWTF three months in a row, the permittee is required to develop a facility plan and schedule within 18 months from the date of the exceedance. This plan or strategy is required to ensure that the permittee will continue to comply with permit limits if capacity is being exceeded.

VIII. OTHER LEGAL REQUIREMENTS

A. Endangered Species Act.

The Endangered Species Act requires federal agencies to consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species. EPA has determined that issuance of this permit will not affect any of the threatened or endangered species in the vicinity of the discharge. In a letter dated November 17, 1999, the USFWS stated that no federally-listed species or critical habitat are found within the project area.

In a letter dated December 20, 1999, the NMFS stated that although the humpback whale and the threatened Steller sea lion do occur in Fritz Cove, NMFS does not believe that this area is close enough to be affected by the Mendenhall WWTF discharge.

B. Essential Fish Habitat.

Section 305(b) of the Magnuson-Stevens Act (16 USC 1855(b)) requires federal agencies to consult with NMFS when any activity proposed to be permitted, funded, or undertaken by a federal agency may have an adverse effect on designated Essential Fish Habitat (EFH) as defined by the Act. The EFH regulations define an *adverse effect* as any impact which reduces quality and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site-specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. EPA has prepared an EFH assessment in Appendix E.

In a letter dated December 20, 1999, the NMFS described the Mendenhall River as a migrational corridor for sockeye, coho, chum, and pink salmon. The river also supports resident sculpin. The mouth of the river supports spawning sand lance, resident sculpin species, and shallow water flatfish.

EPA has tentatively determined that issuance of this permit is **not likely to adversely effect** EFH in the vicinity of the discharge. EPA has provided NMFS with copies of the draft permit and fact sheet during the public notice period. Any comments received from NMFS regarding EFH will be considered prior to reissuance of this permit.

C. State Certification.

Section 401 of the Clean Water Act requires EPA to seek *state certification* before issuing a final permit. The state certification process began consistent with the public notice process. As a result of the certification, the state may require more stringent permit conditions to ensure that the permit complies with water quality standards. The state also may or may not authorize the *mixing zone* used to calculate the effluent limitations in the draft permit. The reasonable potential and effluent limit calculations for fecal coliform, total residual chlorine, and metals are based on a dilution of 10:1, the state's proposed mixing zone for the Mendenhall wastewater treatment facility discharge.

The water quality-based limits in the draft permit are based on the dilution available in that mixing zone for fecal coliform and total residual chlorine. The draft permit has been sent to the state to begin the final certification process. If the state authorizes a different mixing zone in its final certification, the effluent

limitations in the final permit will be recalculated based on the dilution available in the final mixing zone. If the state does not certify the mixing zone, EPA will recalculate the permit limitations based on meeting water quality standards at the point of discharge.

ADEC has pre-certified a mixing zone for fecal coliform bacteria, dissolved oxygen, pH, metals, nutrients, and WET. The mixing zone for this discharge is defined as the area within a rectangle centered over the diffuser with a width of 30 meters and extending both upstream and downstream from the diffuser a distance of 300 meters, and to the full depth of the river. This mixing zone provides a dilution of 10:1.

D. Permit Expiration.

This permit will expire five years from the effective date of the permit.

REFERENCES

EPA 1993. Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria. Memo from Martha Prothro to Water Management Division Directors. October 1, 1993.

EPA 1991. Technical Support Document for Water Quality-based Toxics Control. Office of Water Enforcement and Permits, Office of Water Regulations and Standards. Washington, D.C., March 1991. EPA/505/2-90-001.

EPA, 1996a. EPA Region 10 Guidance For WQBELs Below Analytical Detection/Quantitation Level. NPDES Permits Unit, EPA Region 10, Seattle, WA, March, 1996.

Transmittal letter from Kenwyn George, ADEC, to Dave Palmer, Manager, City and Borough of Juneau, entitled "Preliminary Certificate of Reasonable Assurance for NPDES Permit No. AK-002124-5, City and Borough of Juneau Mendenhall Municipal Wastewater Treatment Facility, Juneau, Alaska," dated 19 April 2000.

Memorandum from Kenwyn George, ADEC, to Madonna Narvaez, entitled "Mendenhall 7Q10 river flows and minimum effluent dilutions," dated 5 July 2000.

LIST OF ACRONYMS

ADEC	Alaska Department of Environmental Conservation
AML	Average Monthly Limit
BAT	Best Available Technology economically achievable
BCT	Best Conventional pollutant control Technology
BMP	Best Management Practices
BPJ	Best Professional Judgement
BOD	Biochemical Oxygen Demand
BPT	Best Practicable Control Technology currently available
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CWA	Clean Water Act
DMR	Discharge Monitoring Report
CV	Coefficient of Variation
EPA	Environmental Protection Agency
LA	Load Allocation
MDL	Maximum Daily Limit
mgd	Million gallons per day
mg/L	Milligrams per liter
ML	Minimum level
MSWLF	Municipal Solid Waste Landfill
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
POTW	Publicly Owned Treatment Works
RP	Reasonable Potential
TMDL	Total Maximum Daily Load
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA 1991)
TSS	Total Suspended Solids
ug/L	Micrograms per liter
USFWS	United State Fish and Wildlife Service
USGS	United States Geological Survey
WLA	Wasteload Allocation
WQBEL	Water quality-based effluent limitation
WWTF	Wastewater treatment facility

APPENDIX A - MENDENHALL WWTF DESCRIPTION

Preliminary treatment

- Flow measurement and recording
- Solids removal (bar screen)

Primary treatment

- Grit removal (grit chamber)
- Biological treatment (activated sludge and sequencing batch reactors (SBR) process)

Secondary treatment

- Secondary clarification
- Chlorination
- Flow measurement
-Dechlorination

Discharge

- Effluent discharge rate is an average of 2.7 mgd (based on monitoring from 1996-1999) and a maximum of 3.3 mgd

Biosolids handling

- Sludge thickening
-Sludge dewatering w/transport to sludge incinerator for final processing

APPENDIX B - MAP OF MENDENHALL WASTEWATER TREATMENT FACILITY

[MAP TO BE INSERTED BEFORE SENT OUT FOR PUBLIC NOTICE]

APPENDIX C - BASIS FOR EFFLUENT LIMITATIONS

Sections 101, 301(b), 304, 308, 401, 402, and 405 of the Clean Water Act (CWA) provide the basis for the effluent limitations and other conditions in the draft permit. The EPA evaluates discharges with respect to these sections of the CWA and the relevant NPDES regulations to determine which conditions to include in the draft permit.

In general, the EPA first determines which technology-based limits must be incorporated into the permit. EPA then evaluates the effluent quality expected to result from these controls, to see if it could result in any exceedances of the water quality standards in the receiving water at the edge of the mixing zone. If exceedances could occur, EPA must include water quality-based limits in the permit. The draft permit limits will reflect whichever requirements (technology-based or water quality-based) are more stringent. The limits which EPA is proposing in the draft permit are found in Section V. of this Fact Sheet.

I. Technology-based Evaluation.

Section 301(b)(1)(B) of the CWA requires that discharges from publicly owned treatment works (POTWs) meet technology-based requirements defined as "secondary treatment" by July 1, 1977. The CWA initially focused on the control of "traditional" pollutants (conventional pollutants and some metals) through the use of "best practicable control technology currently available" (BPT). Section 301(b)(1)(3) of the CWA allowed a deadline for achieving BPT of March 31, 1989, under certain circumstances, but that deadline has also passed. Thus, permits issued after March 31, 1989, must include any conditions necessary to ensure that BPT is achieved.

Section 301(b)(2) of the CWA requires further technology-based controls on effluents. This section of the CWA requires that all permits contain effluent limitations which: (1) control toxic pollutants and nonconventional pollutants through the use of "best available technology economically achievable" (BAT), and (2) represent "best conventional pollutant control technology" (BCT) for conventional pollutants by March 31, 1989. In no case may BCT or BAT be less stringent than BPT.

In many cases, BPT, BCT, and BAT limitations are based on effluent guidelines developed by EPA for specific industries. Where EPA has not yet developed guidelines for a particular industry or a particular pollutant, permit conditions must be established using best professional judgement (BPJ) procedures (40 CFR §§ 122.43, 122.44, and 125.3). Secondary treatment requirements exist for BOD, TSS and pH, as discussed in Section III below.

II. Water Quality-based Evaluation.

In addition to the technology-based limits discussed above, EPA evaluated the discharge to determine compliance with section 301(b)(1)(C) of the CWA. This section requires the establishment of limitations in permits necessary to meet water quality standards by July 1, 1977. Discharges to state waters must also comply with limitations imposed by the state as part of its certification of NPDES permits under section 401 of the CWA.

The NPDES regulation at 40 CFR § 122.44(d)(1) requires that permits include limits for all pollutants or parameters which "are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality." The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation (WLA).

EPA uses the approach outlined below when determining whether water quality-based limits are needed and when developing those limits.

A) Determine the appropriate state-adopted criteria.
B) Determine whether there is "reasonable potential" to exceed the criteria.
C) If there is reasonable potential to exceed the criteria, then develop a WLA.
D) Develop effluent limitations, based on WLAs.

The following sections below provide a detailed discussion of these steps.

A. Water Quality Criteria

The first step in developing water quality-based limits is to determine the applicable water quality criteria. The applicable criteria are determined based on the beneficial uses of the receiving water as identified in Section III of the Fact Sheet. For any given pollutant, different uses may have different criteria. To protect all beneficial uses, the permit limits are based on the most stringent of the water quality criteria applicable to those uses.

Table C-1 lists the most stringent criteria applicable to the discharge. These criteria are contained in Alaska's water quality standards (18 AAC 70) and the National Toxics Rule (40 CFR 131.36).

TABLE C-1 Applicable Water Quality Criteria				
Parameter[1]	**Acute Criterion ug/L**	**Acute Criterion ug/L[2],except where noted**	**Chronic Criterion ug/L**	**Chronic Criterion ug/L[2],except where noted**
Arsenic III		360		190
Chromium III	$e^{(0.819*[\ln(H)]+3.688)}$	630.1	$e^{(0.819*[\ln(H)]+1.561)}$	75.1
Chromium VI		16		11
Cadmium	$e^{(1.128*[\ln(H)]-3.828)}$	2.15	$e^{(0.7852*[\ln(H)]-3.490)}$	0.77
Copper	$e^{(0.9422*[\ln(H)]-1.464)}$	5.52	$e^{(0.854*[\ln(H)]-1.465)}$	4.10
Cyanide		22.0		5.2
Lead	$e^{(1.266*[\ln(H)]-1.416)}$	17.24	$e^{(1.266*[\ln(H)]-4.661)}$	0.67
Mercury		2.4		0.012
Nickel	$e^{(0.846*[\ln(H)]+3.3612)}$	497.7	$e^{(0.76*[\ln(H)]+1.06)}$	37.31
Silver	$e^{(0.72*[\ln(H)]-6.52)}$	1.3	NA	
Zinc	$e^{(0.847*[\ln(H)]+0.8604)}$	40.96		47
Total Ammonia, mg/L				
Total Residual Chlorine				2.0
Whole Effluent Toxicity, TU_c				1.0

1 Freshwater; all forms of metals in total recoverable.
2 A mixed hardness of 29 mg/L $CaCO_3$ for hardness-based criteria.

B. Reasonable Potential Evaluation

When evaluating the effluent to determine if a water quality-based effluent limit (WQBEL) is needed based on chemical specific numeric criteria, a projection of the receiving water concentration (downstream of where the effluent enters the receiving water) for the pollutant of concern is made. If the projected

concentration of the receiving water exceeds the applicable numeric criterion, then there is a reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standards, and a WQBEL is required.

EPA has used the recommendations in Chapter 3 of the *Technical Support Document for Water Quality-based Toxics Control* (TSD, EPA 1991) to conduct this "reasonable potential" analysis for the Mendenhall wastewater treatment facility (WWTF). Reasonable potential (RP) calculations have been made for those pollutants with monitoring data and state criteria. The projected maximum receiving water concentration C_d is determined using the following mass balance equation.

C_d X (Q_e + Q_u) = (C_e X Q_e) + (C_u X Q_u) where,

C_d = statistically projected downstream receiving water concentration
Q_d = receiving water flow downstream of the effluent discharge = Q_e + Q_u
C_e = maximum effluent concentration
Q_e = maximum effluent flow
C_u = upstream, or background, concentration of pollutant
Q_u = upstream flow

1. **Mixing zone/flow conditions**

The dilution used to evaluate compliance with the copper and zinc criteria are based on a mixing zone application submitted by the City and Borough of Juneau and tentatively approved by the Alaska Department of Conservation (ADEC). In accordance with state water quality standards, only ADEC may authorize mixing zones. If the State does not authorize a mixing zone in its 401 certification, the permit limits will be re-calculated to ensure compliance with the standards at the point of discharge.

2. **Step 1 - Maximum projected downstream concentration**

The maximum projected downstream concentration (C_d) is calculated based on the maximum reported effluent concentration and a multiplier (called a reasonable potential multiplier, RP) to account for uncertainty.

a. **Determine the maximum effluent concentrations.** The maximum effluent concentrations were determined for total ammonia, copper, cyanide, lead, silver, zinc, and whole effluent toxicity. Other metals were either not detected or there was not information available on them.

b. **Determine the RP multiplier.** The RP multiplier depends upon the number and variability of the effluent data points. The standard deviation (or scatter of the observation around the mean) of the data is expressed as a percentage of the mean or coefficient of variation (CV). The CV is a measurement of variability of the data. When there are not enough data (i.e., less than 10 data points) to reliably determine a CV, the TSD recommends using 0.6 as a default value. A reasonable potential multiplier may vary from a low of 1 to a high of 368.

The RP multiplier is calculated, assuming 99% confidence level and 99% probability basis (using equations from Section 3.3.2 of the TSD):

RP multiplier = C_{99}/C_x where,

$F^2 = \ln(CV^2 + 1)$
$C_{99} = \exp(2.326\ F - 0.5\ F^2)$
C_x = percentile represented by highest concentration in the data base

c. **Calculate the maximum projected effluent concentration (C_e).**

(1) C_e = (maximum effluent concentration from (a)) x (RP multiplier from (b)).

3. **Step 2 - Determine reasonable potential**

EPA assumed a background concentration of zero for each of the parameters evaluated based on data available for Mendenhall River. The maximum effluent flow is 4.9 mgd.

The following Table compares the maximum projected receiving water concentration (C_d) with the most stringent water quality criteria (C_{dd}). Water quality-based effluent limits were developed for those parameters

that exhibit a reasonable potential to exceed the water quality criteria (that is, where C_d is greater than C_{dd}). The development of water quality-based effluent limits is described in Section C.

Table C-2: Maximum Projected Effluent Concentrations and Reasonable Potential Determination

$C_d = ((C_e \text{ X } Q_e) + (C_u \text{ X } (Q_u \text{ X } \%MZ))) \div (Q_e + (Q_u \text{ X } \%MZ))$

If $C_d > C_{dd}$, then there is reasonable potential and a limit is required

Q_e = 7.58 cfs Q_u = 68.2 cfs %MZ = 100 (use 1.0 in eqn) C_u = 0 for all parameters

Parameter	C_{max} [1,2]	CV[3]	RPF[4]	C_e [1,5]	C_d [1]	C_{dd} [1,6]	RP
Copper[7]	108	0.892	3.1	334.8	33.5	4.10	Y
Cyanide	17	0.6	2.26	38.4	3.8	5.22	N
Lead[7]	19.4	0.6	2.26	43.8	4.38	0.67	Y
Silver[7,8]	7.1	0.6	2.26	16.0	4.4	0.48	Y
Zinc[7,8]	249	0.652	2.4	597.6	59.8	41.0	Y
Total Ammonia, mg/L	23.0	0.3	1.31	30.1	3.01	2.92	Y
Whole Effluent Toxicity, TU_c	3.0	1.18	2.06	6.2	0.62	1.0	N

1 Fg/L, unless otherwise specified.
2 "C_{max}" = the maximum effluent concentration observed.
3 "CV" is the coefficient of variation.
4 "RPF" is the reasonable potential factor.
5 "C_e" is the maximum projected effluent concentration. $C_e = C_{max}$ X RPF
6 "C_d" is the projected maximum receiving water concentration. "C_{dd}" is the chronic aquatic life criterion.
7 Measured as total recoverable.
8 There is no chronic criterion for silver, so the acute aquatic life criterion was used. The acute criterion for zinc was more limiting and therefore was used.

Sample calculations are included at the end of this appendix for total ammonia and whole effluent toxicity.

C. Wasteload allocation development

Once it has been determined that a water quality-based limit is required for a pollutant, the first step in developing a permit limit is development of a WLA for the pollutant. A WLA is the concentration (or loading) of a pollutant that the Permittee may discharge without causing or contributing to an exceedance of

water quality standards in the receiving water. EPA used a mixing zone-based WLA for chlorine, since the requirement for chlorine limits have been retained from the 1994 permit.

Where the state authorizes a mixing zone for the discharge, the WLA is calculated as a mass balance, based on the available dilution, background concentrations of the pollutant(s), and the water quality criteria. Because the different criteria (acute aquatic life, chronic aquatic life, human health apply over different time frames and may have different mixing zones, it is not possible to compare them directly to determine which criterion results in the most stringent limits. For example, the acute criteria are applied as a one-hour average and may have a smaller mixing zone, while the chronic criteria are applied as a four-day average and may have a larger mixing zone. The human health criteria are generally based on a 70-year exposure period. To allow for comparison, each criterion is statistically converted to a long-term average effluent concentration. The criterion that results in the most stringent long-term average concentration is the WLA that is used to calculate the permit limits.

D. Permit Limit Derivation

Once the WLA has been developed, EPA applies the statistical permit limit derivation approach described in Chapter 5 of the TSD to obtain daily maximum and monthly average permit limits. This approach takes into account effluent variability, sampling frequency, water quality standards, and the difference in time frames between the monthly average and daily maximum limits.

The daily maximum limit is based on the CV of the data and the probability basis, while the monthly average limit is dependent on these two variables and the monitoring frequency. As recommended in the TSD, EPA used a probability basis of 95 percent for monthly average limit calculation and 99 percent for the daily maximum limit calculation. As with the reasonable potential calculation, when there is not enough data to calculate a CV (i.e., less than 10 samples), EPA assumes a CV of 0.6 for both monthly average and daily maximum calculations.

III. Effluent Limitations and Monitoring Requirements.

This discussion outlines the basis for each of the effluent limitations in Mendenhall's proposed NPDES permit. The limitations proposed are either technology-based, water quality-based, or a combination of technology and water quality-based information.

A. Biochemical Oxygen Demand (BOD_5) and Total Suspended Solids (TSS)

The Mendenhall wastewater treatment facility (WWTF) is a secondary treatment facility that employs biological treatment. As such, the facility is subject to the technology-based requirements for five-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS) of 40 CFR § 133.102, as outlined in Table C-3.

Table C-3: Secondary Treatment Requirements

Parameter	Monthly Average (mg/L)	Weekly Average (mg/L)	Percent Removal (%)
BOD_5	30	45	85
TSS	30	45	85

In addition to the concentration limits, 40 CFR § 122.45(f) requires that NPDES permits contain mass-based limits for such pollutants as BOD_5 and TSS. The draft permit establishes loading limits based on Mendenhall's current design capacity of 4.9 mgd (40 CFR § 122.45(b)). The limits are calculated by multiplying the concentration limits by the design flow and a conversion factor of 8.34 pound•liter/milligram•million gallons, as shown below:

Monthly Average Load: = (4.9 mgd)(30 mg/L)(8.34)
= **1226 lbs/day**

Weekly Average Load: = (4.9 mgd)(45 mg/L)(8.34)
= **1839 lbs/day**

Maximum Daily Load: = (4.9 mgd)(60 mg/L)(8.34)
= **2452 lbs/day**

The daily maximum limits for BOD_5 and TSS are retained from the current permit.

B. pH

In addition to limits on BOD_5 and TSS, 40 CFR § 133.102 specifies a pH range from 6.0 to 9.0 standard units for POTWs. The State water quality standards for protection of aquatic life (18 AAC 70.020) require that ambient pH be in the range of 6.5 - 8.5 standard units. The draft permit incorporates the water quality-based limits of 6.5 - 8.5 standard units.

C. Fecal Coliform Bacteria

In establishing fecal coliform limits for Mendenhall's draft permit, EPA considered six different requirements: a) Alaska's water quality standard for primary recreation; b) Alaska's water quality standard for secondary recreation; c) the limits in the 1994 permit, d) Alaska's water quality standard for water supply, drinking, culinary, and food processing, and e) Alaska's wastewater treatment regulations at 18 AAC 72 that define disinfection for secondary facilities.

1. The State water quality standards contain criteria for fecal coliform bacteria for waters protected for contact recreation (18 AAC 70.020 (b)(1)(B)(i)).

   Monthly geometric mean: 100/100 ml (based on a minimum of 5 monthly samples).

   Not more than 1 sample or no more than 10 percent if more than 10 samples are collected may exceed 200/100 ml.

2. The State standards for secondary contact recreation (18 AAC 70.020(b)(1)(B)(ii)):

   monthly geometric mean of 200/100 ml (based on a minimum of 5 monthly samples) and

   no more than 10 percent may exceed 400/100 ml.

3. The State standards for water supply, drinking, culinary, and food processing (18 AAC 70.020(b)(1)(A)(i):

   geometric mean MPN may not exceed 20 FC/100 ml and

   not more than 10 percent of the samples may exceed a fecal coliform geometric mean MPN of 40 FC/100 ml.

4. The 1994 permit contained a monthly average limit of 200/100ml, a weekly average limit of 400 FC/100 ml, and a daily maximum limit of 800 FC/100.

5. Alaska wastewater disposal regulations at 18 AAC 72 define "disinfect" as a means to treat by means of a chemical, physical, or other process,

such as chlorination and produces an effluent with the following characteristics:

a. an arithmetic mean of the values for a minimum of five effluent samples collected in 30 consecutive days that does not exceed 200 FC/100 ml; and
b. an arithmetic mean of the values for a minimum of five effluent samples collected in 7 consecutive days that does not exceed 400 FC/100 ml.

The draft permit incorporates the most stringent of the fecal coliform limits for the monitoring period.

Table C-4: Fecal Coliform Limits

Time Period	Monthly Average[1]	Weekly Average[2]	Daily Maximum[3]
Fecal Coliform Bacteria	200	400	400

1 Based on a dilution of 10:1, the geometric mean, based on 5 samples taken over 30 separate days, may not exceed this value.
2 The arithmetic mean of at least 5 samples collected over 7 separate days may not exceed this value.
3 No more than 10 percent of the samples may exceed a daily of this value.

D. Total Residual Chlorine

The State water quality standard for total residual chlorine for protection of aquatic life (18 AAC 70.020(b)(1)(A)(iii)) is 2.0 µg/L measured for salmonid fish, or 10.0 µg/L for other organisms. The facility currently dechlorinates the effluent. The limits contained in the current permit will be retained. Because those values (2 ug/L daily maximum) are below current capability to detect and/or quantify the parameter, EPA is establishing the minimum level (ML) as the quantification level for use in laboratory analysis. For this facility, the ML to be used for chlorine is 0.040 mg/L.

E. Temperature

The State of Alaska water quality criteria for temperature for Mendenhall River states that the discharge may not cause the weekly average temperature to

increase more than 1 EC. EPA does not have sufficient information to apply temperature limits to the Mendenhall WWTF effluent. Therefore, monitoring is required in the draft permit.

F. Total Ammonia (as N)

Low concentrations of ammonia can be toxic to freshwater fish, particularly salmonids. Un-ionized ammonia (NH_3) is the principal toxic form of ammonia. Based on the available information, ammonia limits are needed for the Mendenhall WWTF effluent. The proposed limits are 26.4 mg/L (average monthly limit) and 39.7 mg/L (daily maximum limit).

G. Residues

The state water quality standard (18 AAC 70.020) requires surface waters of the State to be free from floating or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses. This condition will be retained in the draft permit.

H. Dissolved Gas

The state water quality standard (18 AAC 70.020(1)(C)) requires that dissolved oxygen (D.O.) must be greater than 7 mg/L in waters used by anadromous and resident fish. In no case may D.O. be less than 5 mg/L to a depth of 20 cm in the interstitial waters of gravel used by anadromous or resident fish for spawning. EPA does not have sufficient information to apply D.O. limits to the Mendenhall WWTF effluent. Therefore, monitoring is required in the draft permit.

I. Metals and Cyanide

Based on available information, as shown in Table C-2, reasonable potential exists for the Mendenhall effluent discharge to exceed or contribute to exceedances of copper, lead, silver, and zinc criteria. Therefore, effluent limits are needed for those parameters. The effluent limits are shown in Table V-1.

J. WET

Alaska water quality standards at 18 AAC 70.023 state that effluents discharged to a water may not impart chronic toxicity to organic organisms, expressed as 1.0 chronic toxic unit (TUc), at the point of discharge, or if ADEC authorizes a

mixing zone in a certification, at or beyond the mixing zone boundary, based on the minimum effluent dilution achieved in the mixing zone.

Based on available information, WET limits are not necessary for this discharge. WET monitoring is still required.

APPENDIX D - SAMPLE CALCULATIONS

I. Sample Calculations for Reasonable Potential Analysis

Total Ammonia

In the case of the Mendenhall River the beneficial use that needs to be protected is aquatic life. The acute criterion for ammonia is 11.5 mg/L and the chronic criterion is 2.6 mg/L. The acute criterion protects against short term impacts to aquatic life, and the chronic criterion protects against long term impacts to aquatic life. The ammonia criteria are calculated based upon the 95th percentile of upstream pH and temperature values.

The following mass balance equation is used to determine the downstream receiving water concentration:

$$C_d = \frac{(C_e \text{ X } Q_e) + (C_u \text{ X } (Q_u \text{ X } \%MZ))}{Q_e + (Q_u \text{ X } \%MZ)}$$

where,
C_d = receiving water concentration downstream of the effluent discharge
C_e = maximum projected effluent concentration = 30.1 mg/L
Q_e = maximum effluent flow = 7.58 cfs
C_u = upstream concentration of pollutant = 0.0 mg/L
Q_u = upstream flow = 68.2 cfs (7Q10)
%MZ = assume 100 percent mixing zone is authorized by the ADEC

The maximum projected concentration (C_e) for the effluent is equal to the highest observed concentration value of the data set multiplied by the reasonable potential multiplier. Data from January 31, 1996 through August 31, 1999 was used to determine the maximum projected concentration. The highest value observed was on April 30, 1998. It was 23.0 mg/L. The CV is 0.3. The reasonable potential multiplier is 1.31. The maximum projected concentration (C_e) is 30.1 mg/L (23.0 mg/L X 1.31).

The downstream receiving water concentration (C_d) is:

$$C_d = \frac{(C_e \text{ X } Q_e) + (C_u \text{ X } (Q_u \text{ X } \%MZ))}{Q_e + (Q_u \text{ X } \%MZ)}$$

$$C_d = \frac{(30.1 \text{ X } 7.58) + (0.0\text{X } (68.2 \text{ X } 1)}{7.58 + (68.2 \text{ X } 1)} = \frac{228.2}{75.8} \qquad 3.01 \text{ mg/L}$$

The projected concentration downstream exceeds the chronic criterion for ammonia (2.92 mg/L), therefore, a water quality-based effluent limit is required.

Whole Effluent Toxicity

In the case of the Mendenhall River the beneficial use that needs to be protected is aquatic life. Alaska water quality standards at 18 AAC 70.023 state that effluents discharged to a water may not impart chronic toxicity to organic organisms, expressed as 1.0 chronic toxic unit (TUc), at the point of discharge, or if ADEC authorizes a mixing zone in a certification, at or beyond the mixing zone boundary, based on the minimum effluent dilution achieved in the mixing zone.

The maximum projected concentration (C_e) for the effluent is equal to the highest observed value of the data set multiplied by the reasonable potential multiplier. Data from September 29, 1994 through May 20, 1999 was used to determine the maximum projected concentration. The highest value of 2.99 TU_c was observed July 21, 1998. This test used fathead minnows (*Pimephales promelas*). The CV is 1.18. The reasonable potential multiplier is 2.06. The maximum projected concentration (C_e) is 6.23 TU_c (2.99 TU_c X 2.06).

$$C_d = \frac{(C_e \times Q_e) + (C_u \times (Q_u \times \%MZ))}{Q_e + (Q_u \times \%MZ)}$$

where,
C_d = receiving water concentration downstream of the effluent discharge
C_e = maximum projected effluent concentration = 6.23 TU_c
Q_e = maximum effluent flow = 7.58 cfs
C_u = upstream concentration of pollutant = 0.0 TU_c
Q_u = upstream flow = 68.2 cfs (7Q10)
%MZ = assume 100 percent mixing zone is authorized by the ADEC

The downstream receiving water concentration (C_d) is:

$$C_d = \frac{(C_e \times Q_e) + (C_u \times (Q_u \times \%MZ))}{Q_e + (Q_u \times \%MZ)}$$

$$C_d = \frac{(6.23 \times 7.58) + (0.0 \times (68.2 \times 1)}{7.58 + (68.2 \times 1)} = \frac{47.22}{75.8} \quad 0.062\ TU_c$$

The projected concentration downstream is less than the chronic criterion for whole effluent toxicity (1.0 TU_c). Therefore, a water quality-based effluent limit is not required.

II. Sample Calculations for Derivation of Water Quality-Based Effluent Limitations for Total Ammonia and Whole Effluent Toxicity

The purpose of a permit limit is to specify an upper bound of acceptable effluent quality. For water quality based requirements, the permit limits are based on maintaining the effluent quality at a level that will comply with the water quality standards, even during critical conditions in the receiving water (i.e., low flows). These requirements are determined by the wasteload allocation (WLA). The WLA dictates the required effluent quality which, in turn, defines the desired level of treatment plant performance or target long-term average (LTA).

(1) Total Ammonia Calculation

Step 1- Determine the WLA

The acute and chronic aquatic life criteria are converted to acute and chronic waste load allocations (WLA_{acute} or $WLA_{chronic}$) for the receiving waters based on the following mass balance equation:

$$Q_dC_d = Q_eC_e + Q_uC_u$$

where,
- Q_d = downstream flow = $Q_u + Q_e$
- C_d = aquatic life criteria that cannot be exceeded downstream
  - $C_{d(acute)}$ = 12.8 mg/L
  - $C_{d(chronic)}$ = 2.92 mg/L
- Q_e = effluent design flow = 7.58 cfs
- C_e = concentration of pollutant in effluent = WLA_{acute} or $WLA_{chronic}$
- Q_u = upstream flow = 68.2 cfs (7Q10, chronic), 20 cfs (1Q10, acute)
- C_u = upstream background concentration of pollutant = 0 (no data available therefore, assume there is no background concentration)

Rearranging the above equation to determine the effluent concentration (C_e) or the WLA results in the following:

$$C_e = WLA = \frac{Q_dC_d - Q_uC_u}{Q_e}$$

when a mixing zone is allowed, this equation becomes:

$$C_e = WLA = \frac{C_d(Q_u \times \%MZ) + C_dQ_e}{Q_e} - \frac{Q_uC_u(\%MZ)}{Q_e}$$

where, %MZ is the mixing zone[3] allowable by the state standards. The effluent limits have been derived using allowing 100 percent for mixing zone. However, establishing a mixing zone is a State discretionary function. If the State does not certify a mixing zone in the 401 certification process, the effluent limits will be recalculated without a mixing zone.

$$WLA_{acute} = \frac{12.8(20 \times 1) + (12.8 \times 7.58)}{7.58} - \frac{20 \times 0 (1)}{7.58} = 46.6 \text{ mg/L}$$

$$WLA_{chronic} = \frac{2.92(68.2 \times 1) + (2.92 \times 7.58)}{7.58} - \frac{68.2 \times 0 (1)}{7.58} = 29.2 \text{ mg/L}$$

Step 2 - Determine the LTA

The acute and chronic WLAs are then converted to Long Term Average concentrations (LTA_{acute} and $LTA_{chronic}$) using the following equations:

$LTA_{acute} = WLA_{acute} \times e^{[0.5F^2 - zF]}$
where,
F^2 = $\ln(CV^2 + 1) = 0.086$ $e^{[0.5F^2 - zF]} = 0.541$
z = 2.326 for 99th percentile probability basis
CV = coefficient of variation = 0.3

$LTA_{chronic} = WLA_{chronic} \times e^{[0.5F^2 - zF]}$
where,
F^2 = $\ln(CV^2/4 + 1) = 0.022$ $e^{[0.5F^2 - zF]} = 0.716$
z = 2.326 for 99th percentile probability basis
CV = coefficient of variation = standard deviation/mean (the CV was calculated using data from January 1996 through August 1999)

Calculate the LTA_{acute} and the $LTA_{chronic}$:

LTA_{acute} = 25.2 mg/L
$LTA_{chronic}$ = 20.9 mg/L

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[3] Mixing zone - is an allocated impact zone where water quality criteria can be exceeded as long as acutely toxic conditions are prevented. Only the State of Alaska has the regulatory authority to grant a mixing zone.

Step 3

To protect a waterbody from both acute and chronic effects, the more limiting of the calculated LTA_{acute} and $LTA_{chronic}$ is used to derive the effluent limitations. The TSD recommends using the 95th percentile for the Average Monthly Limit (AML) and the 99th percentile for the Maximum Daily Limit (MDL).

Step 4 - Determine the Permit Limits

1. The maximum daily limit (MDL) and the average monthly limit (AML) would be calculated as follows:

$MDL = LTA_{chronic} \times e^{[zF-0.5F^2]}$
where,
F^2 = $\ln(CV^2 + 1) = 0.086$ $e^{[zF-0.5F^2]} = 1.90$
z = 2.326 for 99th percentile probability basis
CV = 0.3
LTA = 20.9 mg/L
MDL = 39.7 mg/L

$AML = LTA_{chronic} \times e^{[zF- 0.5F^2]}$
where,
F^2 = $\ln(CV^2/n + 1) = 0.022$ $e^{[zF-0.5F^2]} = 1.26$
z = 1.645 for 95th percentile probability basis
CV = coefficient of variation = standard deviation/mean = 0.3
n = number of sampling events required per month for ammonia = 4
AML = 26.4 mg/L

Step 5 - Loading limitations

Federal regulations (40 CFR 122.45 (f)) require effluent limits to be expressed as mass based limits. The mass loading limitations for chlorine is as follows:

AML, lbs/day = (Monthly Concentration Limit)(Design Flow Rate)(Conversion Factor)

where:
Monthly Concentration Limit = 26.4 mg/L
Design Flow Rate = 4.9 mgd
Conversion Factor = 8.34
AML = 1079 lbs/day

MDL, lbs/day = (Daily Maximum Concentration)(Design Flow Rate)(Conversion Factor)

where:
Daily Maximum Concentration = 60 mg/L
MDL = 2452 lbs/day

(2) Limits for the other pollutants of concern are shown in the following table.

Table C-6: Water Quality-based Effluent Limits for Mendenhall WWTF

Parameter[1]	**Unit of Measure**	**Monthly Average**	**Daily Maximum**
Copper	Fg/L lbs/day	8.36 0.342	20.1 0.858
Lead	Fg/L lbs/day	5.5 0.225	11.0 0.450
Silver	Fg/L lbs/day	0.87 0.036	1.75 0.072
Zinc	Fg/L lbs/day	71.4 2.92	149.0 6.09
Total Ammonia, as N	mg/L lbs/day	26.4 1079	39.7 1622

1 Metals measured as total recoverable.

APPENDIX E - ESSENTIAL FISH HABITAT ASSESSMENT

Pursuant to the requirements for Essential Fish Habitat (EFH) assessments, this appendix contains the following information:

(1) Listing of EFH Species in the Facility Area
(2) Description of the Facility and Discharge Location
(3) EPA's Evaluation of Potential Effects to EFH

1. Listing of EFH Species in the Facility Area

All waterbodies used by anadromous salmon throughout Alaska must be considered for EFH identification. According to the National Marine Fisheries Service, the Mendenhall River is a migrational corridor sockeye, coho, chum, and pink salmon.

2. Description of the Facility and Discharge Location

The activities and sources of wastewater at the Juneau-Mendenhall waste water treatment facility are described in detail in Part IV. ("Facility and Outfall Description") of this fact sheet. The location of the outfall is described in Part III. ("Receiving Water").

3. EPA's Evaluation of Potential Effects to EFH

Water quality is an important component of aquatic life habitat. NPDES permits are developed to protect water quality in accordance with state water quality standards. The standards protect the beneficial uses of the waterbody, including all life stages of aquatic life. The development of permit limits for an NPDES discharger includes the basic elements of ecological risk analysis. The underlying technical process leading to NPDES permit requirements incorporates the following elements of risk analysis:

Effluent Characterization

Characterization of Juneau-Mendenhall's effluent was accomplished using a variety of sources, including:

Permit application monitoring
Permit compliance monitoring
Effluent variability
Quality assurance evaluations

Identification of Pollutants of Concern and Threshold Concentrations

Identification of pollutants of concern, including:

Pollutants with aquatic life criteria in the Alaska Water Quality Standards. No other pollutants of concern were identified by NMFS.

Exposure and Wasteload Allocation

Analysis of the transport of pollutants near the discharge point with respect to the following:

Mixing zone policies in the Alaska Water Quality Standards
Dilution modeling and analysis
Exposure considerations (e.g., prevention of lethality to passing organisms)
Consideration of multiple sources and natural background concentrations

Statistical Evaluation for Permit Limit Development

Calculation of permit limits using statistical procedures addressing the following:

Effluent variability and non-continuous sampling
Fate/transport variability
Duration and frequency thresholds identified in the water quality criteria

Monitoring Programs

Development of monitoring requirements, including:

Compliance monitoring of the effluent
Ambient monitoring

EPA's approach to aquatic life protection is outlined in detail in the Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001, March 1991).

EPA and states evaluate toxicological information from a wide range of species and life stages in establishing water quality criteria for the protection of aquatic life. For example, the criteria for ammonia in saltwater adopted by the State of Alaska are based on bioassays (predominantly acute tests) of 21 marine species in 18 genera.

The NPDES program evaluates a wide range of chemical constituents (as well as whole effluent toxicity testing results) to identify pollutants of concern with respect to the criteria values. When a facility discharges a pollutant at a level that has a "reasonable potential" to exceed, or to contribute to an exceedance of, the water quality criteria, permit limits are established to prevent exceedances of the criteria in the receiving water (outside any authorized mixing zone).

Since the proposed permit has been developed to protect aquatic life species in the Mendenhall River in accordance with the Alaska water quality standards, EPA has tentatively determined that issuance of this permit is **not likely to adversely affect** any EFH in the vicinity of the discharge. EPA will provide NMFS with copies of the draft permit and fact sheet during the public notice period. Any recommendations received from NMFS regarding EFH will be considered prior to reissuance of this permit.